THE SUCTION SOCKET FOR THE AK STUMP

The following is intended to be an outline of essential features regarding the stump and the socket:

I. Type of Stump

1. Length.

The ideal length of the stump for the suction socket is the same as we consider ideal for the conventional type of AK limb, i.e. 10" to 12" below the trochanter.

Stumps somewhat shorter than this, however, may be very satisfactorily fitted with the suction socket provided the stump is good otherwise. The Germans apply the suction socket to all AK stumps regardless of how short they are. On the shorter stumps they supplement the suction with a harness to hold the limb on.

2. Shape of the Stump.

The shape of the stump should be as normal as possible; that is, more or less cylindrical. All German limb fitters agree that extremely conical type stumps do not lend themselves well to the use of the suction sockets. The stumps should be well shrunk, and should not be bulbous on the end.

3. Deformities.

The stump surface should be smooth with no deep crevices or tissue defects for ideal fitting. Flexion and abduction contractures, of course, should not be present.

4. Scars.

Scars should be minimal, well-healed, and should be in contact with the side of the socket to the least extent possible. They should not form channels admitting air to the socket. Extensive scars on a stump should be removed before the suction socket is applied. Good surgical healing should have taken place before fitting.

5. Infection.

The suction socket should never be applied in the presence of open wounds, draining sinuses, or unusually tender stumps.

6. Musculature.

The stump should have been well exercised by the patient. The muscles should be well developed and strong before the suction socket is applied.

7. Systemic Diseases.

It is probably best not to use the suction socket on patients who have diabetes, and great care should be exercised in its use in the presence of Buerger's disease.

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II. Requirements for the Suction Socket.

1. A plaster cast is always made of the individual patient's stump. While the cast is setting, gentle compression is made by the hands on the upper end of the socket front and back. At the same time the thumbs are used to mold the cast in front and behind the trochanter. The cast is made with the stump relaxed and in slight flexion.

   This is considered to be essential in the making of the cast as the compression results in slight bulging inward of the socket at its upper border anteriorly and posteriorly. This causes the socket to fit snugly around the upper part of the stump so that the principle of the suction socket will not be defeated by a loose fit at this area.

2. In Germany, all AK sockets are made of wood. Instead of one solid block of wood, two pieces are cut out, separately in most cases, after which they are bound together and finished to make the solid AK socket. In some cases the two pieces of wood are bound together before the socket is drawn out.

   Poplar is the type of wood used by necessity. After the pieces of the AK socket are glued together, reinforcement is achieved by winding a cloth tape around a shallow recess in the top, after which rawhiding is carried out in the usual way.

3. The Shape of the Socket as Seen in Germany.

   The shape of the socket at the top is roughly triangular. The base of the triangle is outward at the trochanter and the apex is medially. In this country the base of the triangle is on the inside of the thigh and the apex is at the trochanter. This shape varies somewhat, however, and some of the sockets are more rectangular at the top than triangular. The shape of each individual socket depends upon the shape of the stump for which it is made. There is an inward bulge on the anterior and posterior aspect of the upper end of the socket which is designed to make the top of the socket air tight. This bulge is in the form of a slight ridge which extends practically entirely across the front and back of the socket at the top on the inside.

   The medial aspect of the top of the socket is usually trimmed down fairly low, definitely lower than is usually done in this country. The outer border of the top of the socket is about 3" higher than the inner border.

4. Finishing the Socket.

   The inside dimensions of the socket are somewhat smaller than those of the plaster cast so that a very snug fit is obtained. The inside of the socket is smooth and is painted with a cellulose acetate solution in acetone which waterproofs it against the effects of perspiration.

5. The Valve.

A hole is bored in the lower end of the socket in the outer side approximately 1 ½" in diameter, and the valve is placed in this opening on the exterior wall of the socket.

6. Fitting the Suction Socket.

In order for the suction socket to fit snugly enough to hold itself on by suction, it has to be made so small that it is often difficult to get the stump into it by the ordinary method used on other types of conventional limbs.

To put the limb on, therefore, the patient pulls on a very thin cotton stump sock, both ends of which may be open. The sock is longer than usual and the lower end of the sock, after it is fitted on the stump, is pulled out through the valve opening after which the patient pulls the stump into the socket with the stump sock, pulling the sock off of the stump through the valve opening as the stump goes into the socket. After the stump sock comes off the stump, the patient usually pulls it on out completely through the valve opening but may leave it in the end of the socket to absorb perspiration. The patient then puts his weight down on the artificial limb by two or three shifts of the trunk while he holds the valve open with one finger. After the stump is well seated in the socket the valve remains closed and no further adjustment is necessary until the limb is removed.

Stump may shrink slightly at first, but will probably grow more muscular and toward a cylindrical shape. Space below stump should be 3/4" to 1 ½". Do not fit tapered stumps as snugly at the end as at the top. As stump grows (determined by circumference measurements) the end should be progressively relieved to maintain contact but not firm compression. To determine whether the fit at the upper margin of socket is proper, the color at the end of the stump immediately after wearing should be observed. If the stump is colored a purplish hue, the fit at the top is too tight.

It may be possible, after fitting a few sockets, to determine the tightness of the stump in the socket by the drag of the stump sock on removing it through the valve opening.

During the first fitting of a suction socket, no suction is used. A shoulder harness is used to aid the patient while trying out the socket. Suction is employed only after the socket is correctly and comfortably fitted. Then, merely as a precaution, a light web pelvic belt is attached to the socket at the outside top edge (by an adjustable web strap.)

7. The Very Short Stump.

When the suction socket is applied to the short stump, shoulder harnesses are used to supplement the action of the suction socket.

8. Perspiration.

If there is excessive irration due to perspiration and the patient feels he can not continue use of the socket, there are several other alternatives: (1) wait until cooler weather (2) try our anti-perspiration preparation (3) construction aerobond lined socket, on which experiments are currently proposed. (This new material passes water vapor yet passes air so slowly that an adequate suction can probably be maintained.)